

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 1. (Currently Amended) A current-in-plane (CIP) GMR sensor, comprising:
2 a GMR sensor stack having a width selected to provide a predetermined track
3 width;
4 a spacer layer, having a width substantially equal to the spin valve stack, formed
5 over a free-layer of the GMR sensor stack; ~~and~~
6 an in-stack biasing layer disposed over the spacer and having a width substantially
7 equal to the width of the GMR sensor stack; and
8 an antiferromagnetic layer formed on both sides of the in-stack biasing layer to
9 provide an off-track bias layer.

1 2. (Previously Presented) The CIP GMR sensor of claim 1, wherein
2 the in-stack biasing layer comprises materials selected from the group consisting of NiFe,
3 CoFe, NiFeCr, NiFeX and CoFeX.

1 3. (Canceled)

1 4. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, further
2 comprising lead layers formed on either side of the GMR sensor stack, wherein the lead
3 layers comprises a layer of Rhodium disposed adjacent to the GMR sensor stack and a
4 Tantalum layer formed over the layer of Rhodium.

1 5. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, wherein the
2 antiferromagnetic layer comprises a layer of Platinum-Manganese.

1 6. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, wherein the
2 in-stack biasing layer comprises a bias layer formed only over the spacer and a coupling
3 layer formed over the bias layer and the antiferromagnetic layer.

1 7. (Previously Presented) The CIP GMR sensor of claim 6, wherein
2 the bias layers and coupling layer each comprise a material selected from the group
3 consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

1 8. (Original) The CIP GMR sensor of claim 1 further comprising a cap
2 layer formed over the in-stack bias layer.

1 9. (Currently Amended) A magnetic storage system, comprising:
2 a magnetic storage medium having a plurality of tracks for recording of data; and
3 a current-in-plane (CIP) GMR sensor maintained in a closely spaced position
4 relative to the magnetic storage medium during relative motion between the magnetic
5 transducer and the magnetic storage medium, the CIP GMR sensor further comprising:
6 a GMR sensor stack having a width selected to provide a predetermined
7 track width;
8 a spacer layer, having a width substantially equal to the spin valve stack,
9 formed over a free-layer of the GMR sensor stack; ~~and~~
10 an in-stack biasing layer disposed over the spacer and having a width
11 substantially equal to the width of the GMR sensor stack; and
12 an antiferromagnetic layer formed on both sides of the in-stack biasing
13 layer to provide an off-track bias layer.

1 10. (Previously Presented) The magnetic storage of claim 9, wherein
2 the in-stack biasing layer comprises materials selected from the group consisting of NiFe,
3 CoFe, NiFeCr, NiFeX and CoFeX.

1 11. (Canceled)

1 12. (Currently Amended) The magnetic storage of claim [[11]] 9, further
2 comprising lead layers formed on either side of the GMR sensor stack, wherein the lead
3 layers comprises a layer of Rhodium disposed adjacent to the GMR sensor stack and a
4 Tantalum layer formed over the layer of Rhodium.

1 13. (Currently Amended) The magnetic storage of claim [[11]] 9, wherein
2 the antiferromagnetic layer comprises a layer of Platinum-Manganese.

1 14. (Currently Amended) The magnetic storage of claim [[11]] 9, wherein
2 the in-stack biasing layer comprises a bias layer formed only over the spacer and a
3 coupling layer formed over the bias layer and the antiferromagnetic layer.

1 15. (Currently Amended) The magnetic storage of claim [[9]] 14, wherein
2 the bias layer and the coupling layer each comprise a material selected from the group
3 consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

1 16. (Original) The magnetic storage of claim 9 further comprising a cap
2 layer formed over the in-stack bias layer.

1 17. (Currently Amended) A method for providing a current-in-plane (CIP)
2 GMR sensor with an improved in-stack bias layer with a thinner sensor stack,
3 comprising;
4 forming a thin spin valve stack having a width selected to provide a
5 predetermined track width;
6 forming a spacer over the spin valve stack, the spacer having a width substantially
7 equal to the spin valve stack;
8 forming lead layers in a passive region outside the track;
9 forming, over the spacer, an in-stack bias layer having a width substantially equal
10 to the width of the GMR sensor stack for biasing a free-layer of the spin valve stack; ~~and~~
11 forming a cap over the bias layer; and
12 forming an antiferromagnetic layer on both sides of the in-stack biasing layer to
13 provide an off-track bias layer.

1 18. (Previously Presented) The method of claim 17, wherein forming
2 the lead layers further comprises forming a layer of Rhodium disposed adjacent to the
3 GMR sensor stack and forming a Tantalum layer formed over the layer of Rhodium.

1 19. (Previously Presented) The method of claim 17, wherein the
2 forming of the in-stack bias layer comprises forming a layer of Platinum-Manganese.

1 20. (Previously Presented) The method of claim 17, wherein the in-
2 stack bias layer comprises a bias layer formed only over the spacer and a coupling layer
3 formed over the bias layer and the antiferromagnetic layer.

1 21. (Currently Amended) The method of claim [[17]] 20, wherein the
2 forming of the bias layer and the coupling layer each further comprises using a material
3 selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.